A FRAMEWORK FOR GREEN MANUFACTURING PRACTICES IN SMALL AND MEDIUM ENTERPRISES IN MALAYSIA

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ABSTRACT

Green Manufacturing Practices (GrMP) is a term used to describe manufacturing practices that do not harm the environment during any part of the manufacturing process. It emphasizes the use of processes that do not pollute the environment or harm consumers, employees, or other members of the community. Small and medium enterprises (SMEs) are moving toward sustainable alternatives through GrMP method. It stresses on critical factors such as organisational style, eco-knowledge, business environment, society influences, supply chain management and technology network. Large size industries are more compelled to do so compared to SMEs due to the fact that they are more influential with better organizational management and good financial stability compared to SMEs. However, SMEs are trying to adapt GrMP as a mandatory process, but lack of proper framework which guide them for implementation. Therefore, this study developes the framework of GrMP for local SMEs. The study involves enablers and barriers in implementing GrMP from previous literatures. This work formulate a framework based on relationship between criticals factors with enablers and barriers. 59 of respondents from local industries in Malaysia were selected as respondents based on six of critical factors divided into two parts which are enablers and barriers. The questionnaire are designed based on this. Survey were evaluated by using Statistical Package for the Social Sciences (SPSS) version 23, in terms of correlation, reliability, central tendency and variability testing. The finding on this study in the term of framework will help SMEs to implementing GrMP. Framework formulate relates the critical factors from previous literature and enablers and barriers from survey based on perception of industries expert. GrMP for SMEs are the first step of environmental awareness and ecological responsibilties.

ABSTRAK

Amalan Pengilangan Hijau (GrMP) adalah istilah yang digunakan untuk mempraktiskan amalan perkilangan yang tidak membahayakan alam sekitar semasa mana-mana bahagian proses pembuatan. Perusahaan kecil dan sederhana (PKS) bergerak ke arah alternatif melalui kaedah GrMP. Ia menekankan penggunaan proses yang tidak mencemarkan alam sekitar atau membahayakan pengguna, pekerja, atau ahli komuniti lain. Ia menekankan faktor kritikal yang mempengaruhi GrMP iaitu gaya organisasi, pengetahuan eko, persekitaran perniagaan, pengaruh masyarakat, pengurusan rantaian bekalan dan rangkaian teknologi. Industri bersaiz besar lebih berkebolehan berbuat demikian berbanding PKS disebabkan oleh lebih berpengaruh dengan pengurusan organisasi yang lebih baik dan kestabilan kewangan yang baik berbanding PKS. Walau bagaimanapun, PKS berusaha menyesuaikan diri dengan GrMP sebagai proses wajib, tetapi PKS tempatan yang tidak mempunyai rangka kerja yang betul sebagai panduan untuk mereka laksanakan. Kajian ini membangunkan rangka kerja GrMP di PKS tempatan. Kajian ini mengandungi pemboleh dan halangan dalam melaksanakan GrMP dari kajian literatur terdahulu. Kajian ini membentuk rangka kerja berdasarkan hubungan antara faktor kritikal dengan pemboleh dan halangan. 59 responden dari industri tempatan di Malaysia dipilih sebagai responden berdasarkan enam faktor kritikal yang dibahagikan kepada dua bahagian iaitu pemboleh dan halangan. Soal selidik dibangunkan berdasarkan faktor tersebut. Tinjauan telah dinilai dengan menggunakan versi Pakej Statistik untuk Sains Sosial (SPSS) versi 23, dari segi korelasi, kebolehpercayaan, kecenderungan pusat dan ujian kepelbagaian. Penemuan kajian ini dalam bentuk rangka kerja akan membantu PKS untuk melaksanakan GrMP. Rangka kerja menghubung kaitkan faktor kritikal dari kajian terdahulu dan pemboleh dan halangan dari kaji selidik berdasarkan persepsi pakar industri. GrMP untuk PKS adalah langkah pertama kesedaran alam sekitar dan tanggungjawab ekologi.

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LIST OF ABREVIATIONS

ANP	-	Analytic Network Process
EMS	-	Environmental Management Systems
GM	-	Green Manufacturing
GrMP	-	Green Manufacturing Practices
GSC	-	Green Supply chain
GSCM	-	Green Supply chain Management
MANOVA	-	Multivariate Analysis of Variance
NSDC	-	National Skill Development Corporation
SME	-	Small and Medium Enterprise
SPSS	-	Statistical Package for the Social Sciences

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CHAPTER 1

INTRODUCTION

1.1 Background of study

There are many interpretations of green manufacturing (GM) and all of it conveys similar meanings. Generally, GM can be defined as the three "R"s that is remanufacture, reduce, and reuse/recycle (Kannan *et al*.,2015) which includes activities such as reducing hazardous waste volume, minimizing coolant consumption while machining, and calculating proper energy mixes to ensure a sustainable energy source (Dornfeld *et al*.,2013). Nowadays, in this global world environment is the one crucial one with and change in climate at any point leads to the imbalance of the earth. Based on the environmental, social and economic perspectives, GM means designing, manufacturing, delivering and disposing of products that produce a minimum negative effect on the environment and society and are economically viable (Varinder and Kuldip, 2014). The term GM was coined to reflect a new manufacturing paradigm which implements various green strategies (objective and principles) and techniques (technology and innovation) to become more efficient (Ahmed, 2011).

The main focus of this study is on Green Manufacturing Practices (GrMP) in local small medium enterprises (SMEs). This study focuses on SMEs which lack of environmental concern that should be viewed as an opportunity to expand the local to a global market (Ahmed, 2011). Since SMEs are the long-term survival in development of employees and also enhance productivity and profitability according to Haslinda and Muruga (2016), the GrMP promoted the positive adoption. To implement this practice into the SMEs, there are enablers and barriers that have to be

overcome. In general, large industries are more compelled to implement GrMP due to the as they are more influential with better organizational management and good financial stability compared to SMEs (Raja Ariffin *et al*., 2015).

1.2 Problem statement

GrMP will lead to economic, environmental and social problems from climate change because of the firms consume energy and natural resources in highly unsustainable manner and release large amounts of green house gases (Varinder and Kuldip, 2014). The possible adverse effects of GrMP implementation on profit margins are the worries of industrialists even though implementation provides a competitive edge and other benefit (Hui *et al*., 2001). Due to the environmental and ecological responsibilities, enterprises are trying to adopt GrMP as a mandatory process, but many local SMEs lack the data, resources, technical expertise and experience required to implement green initiatives (Raja Ariffin *et al*., 2015). Effort should be made in such a way that GrMP should come at no additional cost and for this environmental benchmarking of manufacturing process is needed (Minhaj and Shrivastava, 2013). The study on enablers and barriers are very useful to SME to practice GrMP. What is further needed is to organize the enablers and barriers in a more organize and structured manner. The industry in Malaysia lacks structured framework to measure GrMP level of implementation and identify areas of improvement to build a more effective GrMP. In order to fill the gap, this study will develop the framework of GrMP for local SMEs. It is hope that the framework will be a useful tool for SMEs to adopt GrMP.

1.3 Objectives of study

From the problem statement, some important objectives can be identified. These objectives are:-

i. To identify the critical factors which influences GrMP in SME through the enablers and barriers

ii. To study the perception of local industry on enablers and barriers of GrMP

iii. To establish a framework of GrMP for SME in Malaysia based on critical factors, enablers and barriers.

1.4 Scope of study

During this study, some scopes have been set. The scopes of the study are:-

i. This study is conducted at SMEs in Malaysia only.

ii. This study focused on critical factors that affect GrMP that has been established by earlier studies.

iv. This study focused on enablers and barriers which are related GrMP that was suggested by earlier researcher.

1.5 Significance of study

The significance of this research is that it will enable GrMP to be implemented with guidance from the framework and it focus on SMEs in Malaysia. This study will elaborate on the important factors which include the ISO 14001, green supply process, social response, economic perspectives, and waste recovery. The result will assists SMEs to practice GrMP to the fullest and is in accordance to government policies.

1.6 Organisation of thesis

The thesis is organized with the background of research in Chapter 1. This is followed by the literature reviews in Chapter 2. Chapter 3 discussed about the research methodology. The discussion and analysis of data is explained and discussed in Chapter 4. While in Chapter 5 a comprehensive discussion about the formulation and design of the framework in elaborated. Finally in chapter 6, the conclusion and recommendation for further research are presented.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, literature review pertaining to GrMP in SMEs are discussed. Definition and development of GrMP elaborated in Subtopic 2.2. Subtopic 2.3 discuss about SMEs while Subtopic 2.4, application of the framework in GrMP at large industries (locally and internationally) and SMEs was reviewed. This subtopic has covered a relationship between SMEs and GrMP and framework that large industries adopts in many aspects such as environmental, supply chain management, economic, social and others. Issues in implementing GrMP discussed in Subtopic 2.5 which divided into factors, enablers and barriers. Factors of GrMP that reviewed are ISO 14001, green supply, energy saving, water saving and waste recovery. While for enablers and barriers were made into tabulating listed from previous literature that found by some researchers. Subtopic 2.6 are covered about challenges in implement GrMP in SMEs and limitation of existing framework in SMEs. Challenges and issues facing Malaysian industries in implementing GrMP in SMEs based on environment and geographical region are discussed.

2.2 Green Manufacturing Practices (GrMP)

In today's world, the green manufacturing is a major issue. Green manufacturing is the application of one or more of environmental science, green chemistry, environmental monitoring and electronic devices to monitor, model and conserve the natural environment and resources, and to curb the negative impacts of human involvement (Paul *et al*., 2014).

2.2.1 Definition of Green Manufacturing

According to Paul *et al*., (2014) mentioned that Green Manufacturing (GM) which are suitable a sustainable development. From Varinder and Kuldip (2014) was mentioned that GM means designing, manufacturing, delivering, and disposing products that produce minimum negative effect on environment and society and are economically viable. GM also can be defined in two ways which are manufacturing of "green" products, used in renewable energy systems and clean technology equipment of all kinds, and the second is the "greening" of manufacturing which means reducing pollution and waste by minimizing natural resources use, recycling and reusing what was considered waste and reducing emissions. The term of GM was coined to reflect a new paradigm which implements various green strategies (objectives and principles) and techniques (technology and innovation) to become more efficient (Ahmed, 2011). GM lead to production efficiency (i.e. less energy and water usage), lower raw material costs (i.e. recycling waste rather than purchasing virgin materials), reduces environmental and occupational safety expense (i.e. lower regulatory compliance cost and potential liabilities), and improved corporate image (i.e. decrease in negative environmental impact by the public) (Porter and Linde, 1995). The concept of GM is very simple and relate to minimizing the use of resources and the environmental impact of a product. The GM process cycle is shown in Figure 2.1 (Raja Ariffin *et al.,* 2015).

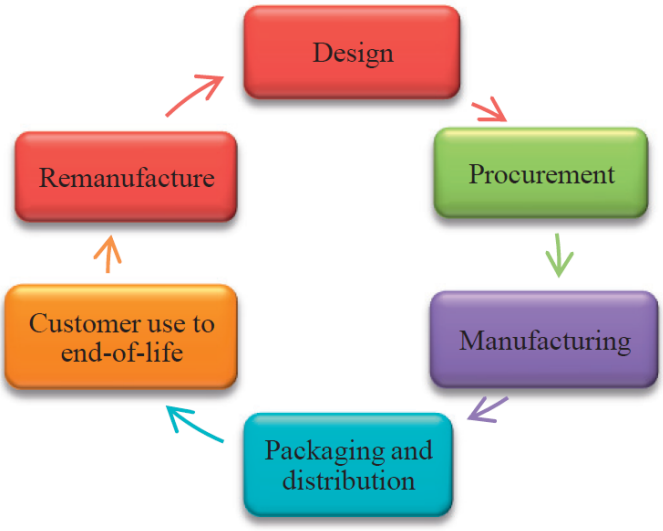

Figure 2.1: GM process cycle (Raja Ariffin *et al*., 2015).

From the GM cycle, it can be seen that the process begun with the design process, followed by procurement, manufacturing, packaging and distribution, customer use to end-of-life and remanufacture. The process begins with the design similar to producing a product. The design should consider the environment, reduction of toxic process, packaging and green material. Followed by procurement process, it included the factor of supplier compliance, recirculation of packing and eco-efficient supply. After the procurement stage, it goes through with the manufacturing process that covers the resources efficiency, energy efficient, toxic free and lean. For packaging and distribution process, the main "3R" is the main role which means returnable, reusable and recyclable process. When the product came to the end of its life, it sent to the disposal center and depending on the condition of the product. For the last stage of this GM cycle is remanufacture. Its process depends on the type, materials, cost, conditions and others. Remanufacture stage will consider the reuse, disassembly, mono materials and low cost of disposal.

Rehman and Shrivastava (2013) mentioned that GM literature taxonomy from previous research stated that GM covered as shown in Figure 2.2. Important elements are divided into 12 broad categories. The highlighted importance and operational technologies, selected approaches or methodologies, tools, trends and experience, measurement, organizational culture, GM practices (industry specific and country specific), elements of GM, legislation issues, economic aspects and integrating GM with quality effort.

REFERENCES

A. Chiarini (2014).Sustainable manufacturing-Greening processes using specific Lean Production tools: an empirical observation from European motorcycle component manufacturers. *Journal of Cleaner Production*, 85. 226-233.

A. Christmann and S. Van Aelst (2006) . Robust estimation of Cronbach's alpha. *Journal of Multivariate Analysis*. 97.1660 – 1674

Ahmed M. Deif (2011). A system model for green manufacturing. *Journal of Cleaner Production*. 19.1553 – 1559

Alexandros Leontitsisa and Jenny Paggea (2007). A simulation approach on Cronbach's alpha statistical significance. *Mathematics and Computers in Simulation*. 73. 336–340

Ali Diabat and Kannan Govindan (2011). An analysis of the drivers affecting the implementation of green supply chain management. *Resources, Conservation and Recycling*. 55.659-667

Allaire, Y. and Firsirotu, M . E. (1984). Theories of organizational culture'. *Organizational Studies*. 3. 193-226.

Anne Ellerup Nielsen and Christa Thomsen (2012). Corporate Social Responsibility (CSR) Management and Marketing Communication: Research Streams and Themes. *Journal of Language and Communication in Business*. 49. 50-65

Azapagic, A., Millington, A., Collett, A., (2006). A Methodology for Integrating Sustainability Considerations into Process Design. *IChemE* 84(6),439-452

Bernand A.Agana, Darrell Reeve and John D. Orbell (2013). An approach to industrial water conservation – A case study involving two large manufacturing companies based in Australia. *Journal of Environmental Management*.114.445-460

Bijay K. Jayaswal, Peter C. Patton & Ernest H.Forman (2007). *Development The Analytic Hierarchy Process (AHP) in Software*. Prentice Hall.

Bob Giddings, Bill Hopwood and Geoff O'Brien (2002). Environment, Economy And Society: Fitting Them Together Into Sustainable Development. *Sustainable Development*. 10, 187–196

Bowen FE, Cousins PD, Lamming RC and Faruk AC (2001). The role of supply management capabilities in green supply. *Production and Operations Management*. 10.174–89

Carter CR and Ellram LM (1998). Reverse logistics: a review of the literature and framework for future investigation. *Journal of Business Logistics*,19,85–102.

Carter CR and Ellram LM (1998). Reverse logistics: a review of the literature and framework forfuture investigation. *Journal of Business Logistics*. 19.85–102.

Carter CR, Ellram LM and Ready KJ (1998). Environmental purchasing: benchmarking our German counterparts. *International Journal of Purchasing &Materials Management*.34. 28–38

Catherine M. Castellan. (2010). Quantitative and Qualitative Research: A View for Clarity.*International Journal of Education.* Vol. 2, No. 2: E1

Cathy Lynne Costin (2011). Craft Production Systems. *Archaeology at the Millennium* pp 273-327

Chandra Sekhar, Manoj Patwardhan and Vishal Vyas (2015). A Delphi – AHP – TOPSIS based framework for the prioritization of intellectual capital indicators: A SMEs perspectives. *Procedia – Social and Behavioral Sciences*. pp. 275-284

Cheng, C.C. and Shiu, E.C. (2012). Validation of a proposed instrument for measuring eco-innovation: An implementation perspective, Technovation. *Global Forum on Environment on* eco-innovation. 32.329-344.

Chien Khay Choong, Boon Cheong Chew, and Mohd Syaiful Rizal Abdul Hamid (2015). Implementation of green supply chain management for production: a case study in sony (malaysia) sdn. Bhd. *Journal of Technology Management and Business*. Vol 2.pp, 1 -19

Chien, M. K. and Shih, L. H. (2007). An Empirical Study of the Implementation of Green Supply Chain Management Practices in the Electrical and

Electronic Industry and their Relation to Organizational Performances. *International Journal of Environmental Science and Technology*. 3.383-394

Chin Yee Whah. (2006). Penang small and medium enterprises: struggle, accommodation and challenges, *Akademika USM*, 69(1), 17–35.

Connelly and L.M. (2011). Research roundtable Cronbach's alpha. *Medsurg Nursing*. pp. 20:1.

Cooper, S. (2004). *Corporate social performance: A stakeholder approach (Corporate Social Responsibility Series).* Hants, UK: Ashgate Publishing.

Cornelissen, J. (2011): *Corporate communications. Theory and Practice.* London: Sage Publications.

Cory R.A. Hallam and Carolina Contreras (2016). The Interrelation of Lean and Green Manufacturing Practices: A Case of Push or Pull in Implementation. *Technology Management for Social Innovation*. pp.1815-1823

Cronbach, L., & Meehl, P. (1955). Construct validity in psychological tests. *Psychological Bulletin*. 52. 281–302.

Dalhammar, and C. J., (2000). *Implementation and Certification of EnvironmentalManagement Systems in Small Enterprises.* IIIEE Reports. Lund University, Sweden.

David R. Hillis & J. Barry Duvall (2013). *Improving profitability through green manufacturing (Creating a profitable and Environmentally compliant manufacturing facility).* Greenville, North Carolina. A. John Wiley & Sons. Inc. Publication

Deloitte and Touche, (1992). *Business strategy for sustainable development: leadership and accountability for the 90s*. International Institute for Sustainable Development

Donald S.Tibben-Lembke and Dale S. Rogers (2002). Difference between forward and reverse logistic in a retail environment. *Special feature-Reverse Logistics*. 7. 271-282

Dornfeld,D., Yuan,C., Diaz,N., Zhang,T., Vijayaraghavan (2013). Introduction to Green Manufacturing. In: Green Manufacturing. *Springer US*. pp. 1-23

Drew Westen and Robert Rosenthal (2003). Quantifying Construct Validity: Two Simple Measures. *Journal of Personality and Social Psychology*. 3. 608–618

E.A Abdelaziz, R.Saidur and S. Mekhilef (2011). A review on energy saving strategies in industrial. *Renewable and Sustainable Energy Reviews.* 15. 150-168

Erickson, F. (1986). *Qualitative methods in research on teaching. In M. C, Wittrock (Ed.),* Handbook of research on teaching (pp 119-161). New York, NY: Macmillan Publishing Company

Fawzi Halila and Joakim Tell (2013). Creating synergies between SMEs and universities for ISO 14001certification. *Journal of Cleaner Production*. 48 , 85-92

George Abonyi (2003). Challenges of Industrial Restructuring in a Globalizing World: Implications for Small- and Medium- scale Enterprises (SMEs) in Asia. *ISEAS Working Paper*.3, 2 – 41

George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference. 11.0 update (4th ed.)*. Boston: Allyn & Bacon.

Greeno, L. J. and Robinson, S.N. (1992). Rethinking Corporate Environmental Management, *The Columbia Journal of World Business* .27. 222-232.

Griffith, A.(2000). Integrated management systems: a single management system solution for project control?. *Engineering, Construction and Architectural Managemen*.7. 232–240.

Gurudas Nulkar (2014). SMEs and environmental performance – A framework for green business strategies. *Procedia – Social and Behavioral Sciences*. 133. 130-140

Gwen Christini, Michael Fetsko and Chris Hendrickson, M.ASCE3(2004). Environmental Management Systems and ISO 14001 Certification for Construction Firms. *Journal of construction engineering and management*. 3. 330-336.

Hamner B (2006). Effects of green purchasing strategies on supplier behavior. In:. Greening the supply chain. *London: Springer*; pp. 25–37

Haslinda Musa and Muruga Chinniah (2016). Malaysian SMEs Development: Future and Challenges on Going Green. *Procedia - Social and Behavioral Sciences* .224 , 254 – 262

Helen Noble and Joanna Smith (2014). Qualitative data analysis: a practical example. *Evidence Based Nursing*. 17. 2-3

Hervani AA, Helms MM, and Sarkis J. (2005). Performance measurement for green supply chain management. *Benchmarking: An International Journal*;12(4):330–53.

Hsiao-Fan Wang and Surendra Gupta (2011). *Green Supply Chain Management: Product Life Cycle Approach*. 1st Edition. Mc Graw Hill. USA

Hui,I.K., Chan, A.H.S.,Pun, and K.F (2001). A study of the environmental management system implementation practices, *Journal Clean Production*. 9,269-276

I.D.Paul, G.P.Bhole, and J.R Chaudhari (2014). A review on Green Manufacturing: It's important, Methodology and its Application. *Procedia Materials Sciences*. 6,1644-1649

Isaac, S. and W.B. Michael. (1995). *Handbook in Research and Evaluation*. 3rd ed. San Diego, CA: EdITS.

Jamal Hosseini Ezzabadi, Mohammad Dehghani Saryazdi and Ali Mostafaeipour (2015). Implementing Fuzzy Logic and AHP into the EFQM model for performance improvement: A case study. *Applied Soft Computing*. 36,165-176

Joseph A. Gliem and Rosemary R. Gliem (2003). Calculating, Interpreting, and Reporting Cronbach's Alpha Reliability Coefficient for Likert-Type Scales. *Midwest Research to Practice Conference in Adult, Continuing, and Community Education.*pp, 82-88

Joseph Sarkis (2001). *Greener Manufacturing and Operations*. Sheffield U.K. Greenleaf Publishing.

Jung (2011). A bibliometric analysis on green supply chain management: a preliminary result. *International proceeding of the IEEE 13th Conference on Commerce and Enterprise Computing* pp, 418-420

Kannan Govindan, Ali Diabat and K.Madan Shankar (2015). Analyzing the drivers of green manufacturing with fuzzy approach. *Journal of Cleaner Production*. 96,182-193

Kannan Govindan, Mathiyazhagan Kaliyan and Devika Kannan (2014). Barriers analysis for green supply chain management implementation in Indian

industries using analytic hierarchy process. *International Journal Production Economics*. 147, 555-568

Katie Anne Adamson, PhDa,, Susan Prion and EdDb, (2013). Reliability: Measuring Internal Consistency Using Cronbach's alpha. *Clinical Simulation in Nursing*. 9, e179-e180.

Klassen RD, McLaughlin CP (1996). The impact of environmental management on firm performance. *Management Science*. 42(8):1199–214.

Lele, S. (2009) *'Getting serious about Green manufacturing'*, JO Market Insight Asia Pacific Industrial Technologies Frost and Sullivan, available at http://www.frost.com/prod/servlet/cio/168777968 (accessed on 19 September 2017).

M. L. Plume (2003). *SPSS (Statistical Package for the Social Sciences). Framingham State College*. Encyclopedia of Information Systems, Volume 4.

M. Zareinejad, D. Di Caprio and M.A. Kaviani (2015). An Integrated Intuitionistic FuzzyAHP and SWOT Method for Outsourcing Reverse Logistics. *Applied Soft Computing Journal*. 784,1568-4946

MacDonald and J.P., (2005). Strategic sustainable development using the ISO 14001 standard. *The Journal of Cleaner Production* 13, 631-643.

Malaysia (2009). *Malaysia's Pledge towards global GHG emission reduction*. 15th Conference of Parties. (COP-15)

Malaysia (2015). *Implementation of Green Technology Policy in Malaysia*. Ministry of Energy, Green Technology & Water Malaysia (KeTTHA)

Manzini, R., Accorsi, R., (2013). The New Conceptual Framework for Food Supply Chain Assessment. *Journal of Food Engineering*. 115(2): 251-263.

Martin Janicke. (2012). ''Green growth'':From a growing eco-industry to economic sustainability. *Energy Policy*. 48, 13–21

Min H, and Galle WP (2001). Green purchasing practices of US firms. *International Journal of Production and Operations Management*;21(9):1222–38.

Minhaj A.A. Rehman and R.L. Shrivastava (2013). Green manufacturing (GM): past, present and future (a state of art review). *World Review of Science, Technology and Sust. Development*. 10, 18 – 48

Minhaj Ahemad. A.Rehman, R.R Shrivastava and Rakesh.L Shrivastava.(2013) Validating Green Manufacturing (GM) Framework for Sustainable Development in an Indian Steel Industry. *Universal Journal of Mechanical Engineering*., 1(2) 49-61,

Mitrabinda Singh, Martin Brueckner and Prasanta Kumar Padhy (2015). Environmental management system ISO 14001: effective waste minimisation in small and medium enterprises in India. *Journal of Cleaner Production*. 102, 285-301

Mohsen Tavakol, and Reg Dennick (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*. 2,53-55

Monczka, Robert M (2009). *Purchasing & supply chain management*. 4th ed. Mason, Ohio : South-Western Cengage Learning

Monette, D.R., T.J. Sullivan and C.R. DeJong. (2002). *Applied Social Research*. Orlando, FLA: Harcourt Press.

Motwani Jaideep. (2001) "Critical factors and performance measures of TQM". *The TQM Magazine* .13, 4. Pp 292 -300,

N.Z. Noor Hasnana, N.Ab. Aziza, N. Zulkifli, and F.S. Taip (2014). Food Factory Design: Reality and Challenges Faced by Malaysian SMEs. *Agriculture and Agricultural Science Procedia*. 2 , 328 – 336

Neuman, W.L. (1997). *Social Research Methods: Qualitative and Quantitative Approaches*. 3rd ed. Boston: Allyn and Bacon.

New South Wales Government. (1998). *''Environmental Management Systems Guidelines.''* Construction Policy Steering Committee, Sydney, Australia.

Nidumolu, R., Prahalad, C.K., and Rangaswami, M.R. (2009). Why Sustainability Is Now the Key Driver of Innovation, *Harward Business Review* , 87/957-64.

OECD (2008).*Environmental innovation and global markets, report for the Working Party on Global and Structural Policies,* ,Paris:OECD,www.olis.oecd.org/olis/2007doc.nsf/LinkTo/NT00005CD6/$FILE/JT03241008.PDF

Oksana Seroka-Stolka (2014). The development of green logistics for implementation sustainable development strategy in companies. *Procedia Social and Behavioral Sciences*. 151,302-309

Orlitzky, M. (2008). Corporate Social Performance and Financial Performance: *A research Synthesis*. Chapter 5, 114-134

Paul D. Reynolds (1986). Organizational culture as related to industry, position and performance: A preliminary report. *Journal of Managemmt Studies*. 1986, 0022-2380

Paul F.M. Krabbe (2016). Reliability. *The Measurement of Health and Health Status,* 135-150

Pius Achanga, Esam Shehab, Rajkumar Roy and Geoff Nelder.(2006) "Critical success factors for lean implementation within SMEs". *Journal of Manufacturing Technology Management*. Pp, 460-471

Podnar, K. (2008): Guest Editorial: Communicating Corporate Social Responsibility. *In Journal of Marketing Communications*. 14(2), 75-81.

Polit, D.F., Beck, C.T. and Hungler, B.P. (2001), *Essentials of Nursing Research: Methods, Appraisal and Utilization*. 5th Ed.,

Porter ME and van der Linde C (1995). Green and competitive: ending the stalemate. *Harvard Business Review*, 73,120–34.

Preuss L (2001). In dirty chains? Purchasing and greener manufacturing. *Journal of Business Ethics*;34(3):345–59.

Raja Ariffin Raja Ghazilla, Novita Sakundarini, Salwa Hanim Abdul-Rashid, Nor Syakirah Ayub, Ezutah Udoncy Olugu and S.Nurmaya Musa (2015).. Drivers and Barriers analysis for green manufacturing practices in Malaysian SMEs: A Preliminary Findings. *Procedia CIRP Global Conference on Sustainable Manufacturing* 26,658-663

Ranganathan, J. (1998). Sustainability rulers: Measuring corporate environmental and social performance. *Sustainability Enterprise Perspective*, May, 1-11. Washington.

Rao P. (2004) Greening production: a South-East Asian experience. International *Journal of Operations & Production Management*;24(3):289–320.

Rao P.(2002). Greening the supply chain: a new initiative in South East Asia. *International Journal of Operations and Production Management*;22(6):632–55.

Reich-Weiser, C., A. Vijayaraghavan and D. Dornfeld (2008). "Metrics for Sustainable Manufacturing" *Proceedings of the 2008 International Manufacturing Science and Engineering Conference*, Illinois,. pp 49-81

S.Maryam Masoumik, Salwa Hanim Abdul-Rashid and Ezutah Udoncy Olugu (2015).. Importance-Performance Analysis of Green Strategy Adoption within the Malaysian Manufacturing Industry, *CIRP Global Conference on Sustainable Manufacturing*. 26,646-652

Saaty T.L. (1980) *The Analytic Hierarchy Process*.McGraw-Hill,New York.

Saaty, T.L. (2008). Decision making with the analytic hierarchy process. *International Journal Services Sciences* Vol. 1, No. 1, pp.83–98.

Shawnee K. Vickery, Jayanth Jayaram, Cornelia Droge , and Roger Calantone (2003). The effects of an integrative supply chain strategy on customer service and financial performance: an analysis of direct versus indirect relationships. *Journal of Operations Management*. 21, 523–539

Shen, Y. J., and Walker, D. H. T. (2001). ‘‘Integrating OHS, EMS and QM with constructability principles when construction planning—A design and construct project case study.’’ *TQM Mag*., 13, 247–259.

Srivastava S. K. (2008). Network design for reverse logistics. Omega: The *International Journal of Management Science*, 36 (4), 535–548.

Swapnil V. Ghinmine and Dilip I. Sangotra. (2015) Implementation of Green Manufacturing in Industry - A case study. *International Journal of Research in Engineering and Technology*., 04,2319-1163,

T. Ramayah, Osman Mohamad, Azizah Omar, Malliga Marimuthu and Jasmine Yeap Ai Leen. (2013). Green Manufacturing Practices and Performance among SMEs: Evidence from a Developing Nation. IGI Global.50, 1026-1027

Talib, H.H.A., Ali, K.A.M., Idris, F., (2013). Quality Management Framework for the SME's Food Processing Industry in Malaysia. *International Food Research Journal* 20(1), 147-164.

Tariq K.Eltayeb, Suhaiza Zailani and T.Ramayah (2011). Green supply chain initiatives among certified companies in Malaysia and environmental sustainability: Investigating the outcomes. *Resources, Conservation and Recycling*. 55,495-506

Taylor, S.R. (1992), Green management: the next competitive weapon. *Futures*. Vol. 24 No. 7, 669-80.

Tibben-Lembke RS (1998). The impact of reverse logistics on the total cost of ownership.*Journal of Marketing Theory and Practice*. 6(4):51–60.

Ting, O.K. (2004). *SMEs in Malaysia: Pivot points for Change*. Available at http://www.mca.org.my

Tomoo Machiba. (2010). Eco-innovation for enabling resource efficiency and green growth: development of an analytical framework and preliminary analysis of industry and policy practices. *International Economics and Economic Policy*. 7,357–370

Tsoulfas, G. and Pappis, C. (2006). Environmental principles applicable to supply shains design and operation. *Journal of Cleaner Production*, 14 No. 18, 1593-602.

Uren, S., and Griffiths, E. (2000). *Environmental management in construction,* CIRIA, London.

Van Hemel, C. and J. Cramer (2002).. Barriers and stimuli for ecodesign in SMEs, *Journal of Cleaner Production*. 10, 439-453

Van Riel, C.B.M. (1995): *Principles of Corporate Communication*. Prentice Hall, Harlow.

Varinder Kumar Mittal and Kuldip Singh Sangwan (2014). Prioritizing Barriers to Green Manufacturing: Environmental, Social and Economic Perspectives, *Procedia CIRP Conference on Manufacturing Systems* 17,559-564.

W. Gary Simpson and Theodor Kohers (2002). The Link Between Corporate Social and Financial Performance: Evidence from the Banking Industry. *Journal of Business Ethics*. 35, 97–109

Walton SV, Handfield RB, Melnyk SA (1998). The green supply chain: integrating suppliers into environmental management process. *International Journal of Purchasing and Materials Management* .34(2):2–11

Zhu Q, Sarkis J, and Lai K (2007). Green supply chain management: pressures, practices and performance within the Chinese automobile industry. *Journal of Cleaner Production*;15(11–12):1041–52.

Zuhairah Hasan and Noor Azman Ali (2015). The impact of green marketing strategy on the firm's performance in Malaysia. *Procedia - Social and Behavioral Sciences*. 172, 463 – 470